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POULTRY FEEDING

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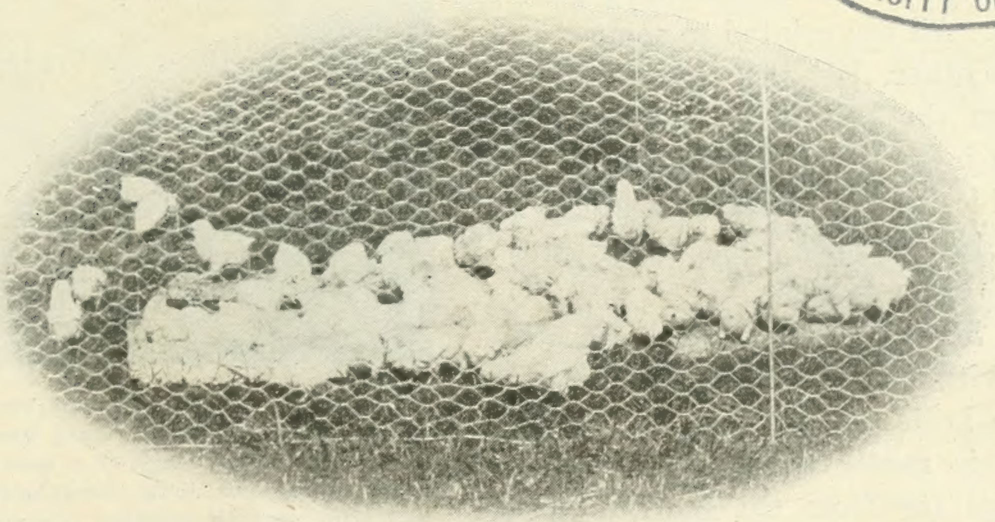

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POULTRY FEEDING

By F. S. Jacoby.

The importance of poultry on the farm is being recognized more and more by the average farmer and, with this added interest, there is a desire to raise better poultry by using up-to-date methods. In Ohio, the production of eggs is the most profitable phase of poultry keeping, although there are a large number of farmers who annually sell on the market large quantities of live and dressed poultry. To produce eggs and poultry at a profit requires a knowledge of feeding that covers the entire life of the fowl. It is the purpose of this bulletin to discuss a few of the problems that the poultryman must solve if he would be successful.

1. THE LAYING HEN

Egg production is influenced by several factors, among which may be mentioned the hen, the methods of housing, the feed and the general care. All are related in some way to each other, but the relationship between the hen and the feed is the most important. Therefore, it is advisable, at the outset, to study the hen and to note what constitutes a good egg-producer.

A laying hen should be healthy. Activity in scratching and foraging is an indication of health; the weak fowl is rarely active and does not forage far from the poultry house. She remains on the perch after the others have gone in search of food and returns to roost early in the afternoon. The fowl that forages far out in the fields is usually the one that is in search of food to make eggs. The head and its appendages also show indications of health and vitality. The strong fowl has a broad head with a short, well-curved beak. The eye is bright and full; the wattles and comb, bright red and of medium size. A very large comb does not necessarily indicate the best health, and has the disadvantage of being frozen in severe weather. However, a hen with a shrunken comb, a long, flat head, and a correspondingly

The result of selection and breeding. Hatched May 20, 1912. Laid first egg October 3, 1912, at age of 4 months 14 days. Note the long, deep body and beautiful smooth plumage, characteristics of health and vigor.

long beak, should never be used for breeding purposes; she is rarely a profitable layer. Beautiful plumage indicates health; it should be smooth, fully developed, glossy and brilliantly colored. Dull plumage indicates weakness.

The shape of the body is an important characteristic. A laying hen has a deep, broad body, indicating abundant space for a large digestive and reproductive system. Unless a hen can consume and digest a large quantity of feed, she cannot produce a steady yield of eggs. The legs should be of medium length, strong, and placed well apart. The neck should be short and thick; the breast full and round, and the keel well covered with meat. The tail should be carried erect; this characteristic is more noticeable among male birds than among pullets or hens.

A hen must have a keen appetite and must consume large quantities of food if she is to produce eggs economically and maintain a healthy body. Unless she is able to digest and assimilate food, thus keeping her body strong and healthy, it is useless to expect a profit in the production of eggs. Loss of appetite is regarded as a symptom of many common diseases. A sick hen is unprofitable.

2. FEEDING THE LAYING HEN

There is a close relationship between the food eaten by the hen and the eggs laid. A study of different grains shows that they contain five elements,—water, ash, protein, carbohydrates, and fat, varying in quantity. The body of the fowl and the egg contain these same elements although in different form. This may be seen by comparing the composition of grains and other foods, which are the raw materials, with the body of the hen and the egg, which are the finished products.

TABLE SHOWING COMPOSITION OF POULTRY, EGGS AND POULTRY FEEDS.

	Water. Per Cent.	Ash Per Cent.	Protein Per Cent.	Carbohydrates. Per Cent.	Fat Per Cent.
Corn	10.6	1.5	10.3	72.6	5.0
Wheat bran	11.9	5.8	15.4	62.9	4.0
Meat scraps (exceedingly variable	10.7	4.1	71.2	0.3	13.7
Mangels	90.9	1.1	1.4	6.4	0.2
Hen	55.8	3.8	21.6	....	17.0
Pullet	55.4	3.4	21.2	....	18.0
Capon	41.6	3.7	19.4	....	33.9
Fresh egg	65.7	12.2	11.4	....	8.9

The ash (mineral matter) of feeds is changed to bone and egg shell in the body of the fowl; the protein is changed from gluten into lean meat or egg albumen and the carbohydrates and the fat are converted from starch, sugar and oil into the fat of the body or the yolk of the egg. Since the hen uses these elements in a certain proportion in her body, it is evident that to avoid waste they should be fed in nearly the same proportion. It is impossible for a hen to do her best in laying eggs if she is fed a ration rich in carbohydrates and fat but containing ilttle protein; she has plenty of material for the yolk of the egg, but lacks the material to make albumen. Carbohydrates cannot be changed into protein. On the other hand, protein can be changed into fat, but, as protein is the expensive and very small part of the grain, it is economy to feed only as much as is necessary to form the lean meat and produce the egg albumen.

A knowledge of the composition of feeds is necessary in order to make a ration containing these elements in the proper proportion. Not all the protein and carbohydrates in grains are digestible, so that, in computing a ration, only the digestible nutrients should be considered. The following table gives the digestible nutrients in one hundred pounds of the different grains, vegetable foods and by-products that are ordinarily used for poultry feed.

GRAIN*

	Dry Matter.	Ash.	Protein.	Carbohydrates.	Fat
Corn	89.4	1.5	7.8	66.8	4.3
Wheat	89.5	1.8	8.8	67.5	1.5
Oats	89.6	3.2	8.8	49.2	4.3
Buckwheat	86.6	2.0	8.1	48.2	2.4
Sunflower seed	91.4	2.6	14.8	29.7	18.2

GROUND FEEDS AND BY-PRODUCTS.

	Dry Matter.	Ash.	Protein.	Carbohydrates.	Fat
Wheat bran	88.1	5.8	11.9	42.0	2.5
Wheat middlings	88.8	4.4	13.0	45.7	4.5
Linseed oil meal (O. P.)	90.2	5.5	30.2	32.0	6.9
Gluten meal	90.5	1.5	29.7	42.5	6.1
Corn meal	85.0	1.4	6.1	64.3	3.5
Alfalfa meal	91.9	8.8	10.5	40.5	0.9
Meat scraps	89.3	4.1	66.2	....	13.4
Skim milk	9.4	0.7	2.9	5.3	0.3

VEGETABLE FOODS.

Green alfalfa	28.2	2.7	3.6	12.1	0.4
Green red clover	29.2	2.1	2.9	13.6	0.7
Mangel beets	9.1	1.1	1.0	5.5	0.2
Rye forage	23.4	...	2.1	14.1	0.4
Cabbage	10.0	.8	2.3	5.9	0.1
Rape (Dwarf Essex)	14.3	2.5	2.0	8.2	0.2

There are many other feeds that can be utilized but, if it is necessary to purchase the feed, those mentioned will be found the most economical. There are several requirements of a good poultry ration other than the chemical composition. Professor Rice of Cornell University has summarized these requirements as follows:

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* Henry's, "Feeds and Feeding."

1. It should be composed of foods every one of which the fowls like.

2. It should contain a sufficient quantity of digestible nutrients

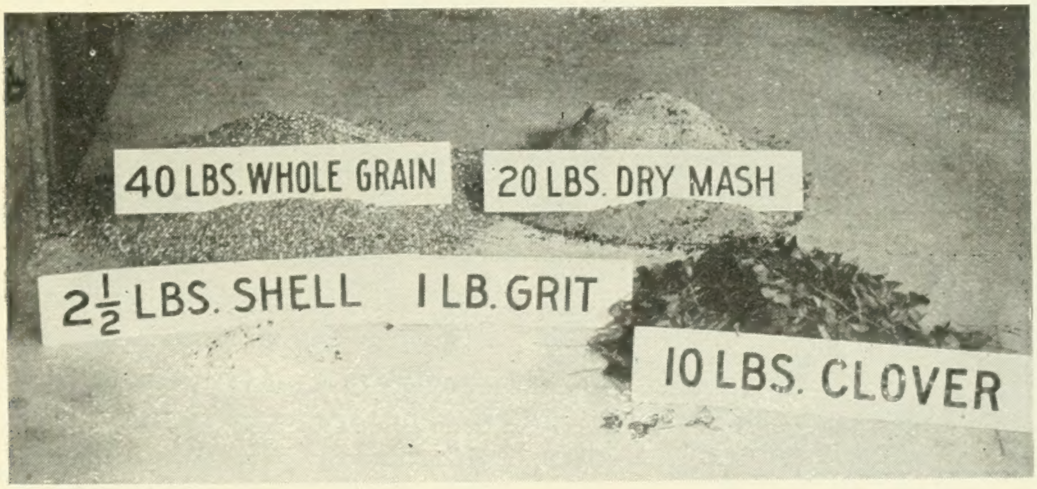
3. It should have enough bulk to enable the digestible secretions to act quickly upon it.

4. It should not contain an excess of indigestible fiber.

5. A certain proportion should be of whole grain and ground feed.

6. It should provide a variety of foods.

7. None of the foods should have an injurious effect upon the color or flavor of the egg.



A balanced ration must contain whole grain, ground grain, green food, grit and shell in the proportion needed by the hen.

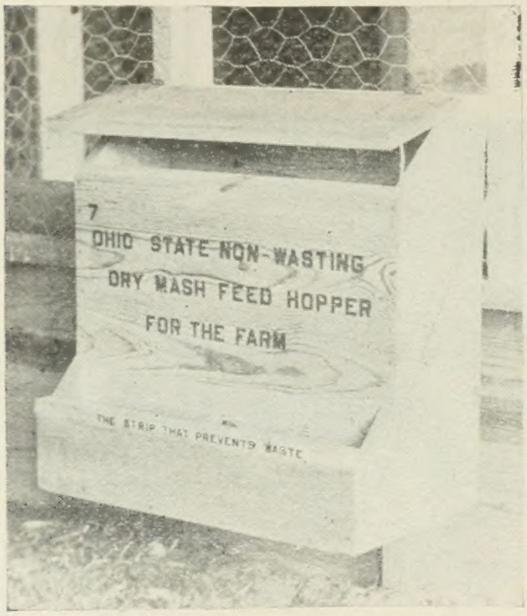
8. The ration must be adapted to the purpose for which it is fed, i. e., fattening or egg production.

9. The ration should be balanced, i. e., contain the food nutrients in the proportion in which they are needed.

10. The ration must be cheap.

It will require a little care and thought to prepare a ration that meets with all the above requirements, but it is not a difficult task. A **balanced** ration means a saving in the feed bills. Grain should constitute about two-thirds of the ration and should be fed morning and evening in a deep litter of straw or scratching material. Exercise is important for the health of the fowl and means increased egg production. In the morning, the hens should not be given a full feed, but about the quantity they will clean up in an hour or less. A fowl with a full crop will not take much exercise. In the evening the hens may be given all they will eat, so that their crops will be well filled when they go to roost. The exact quantity of feed will depend upon the breed, the season of the year, the age and the appetite of the hens. Hens in full laying will consume more feed than sitting hens and certain breeds will consume almost a third more feed than others. A **hen** will often become too fat on the quantity of feed that would be required by a **pullet** in good laying condition. No rule definitely fixing the quantity of feed can be laid down. Successful feeding is the result of daily observation and experience.

A laying hen must have a surplus of fat in the body. This fat is necessary for the first step in the development of the egg. The dry matter of the yolk of the egg contains about 64% fat. As this is the first part of the egg to be formed, it is essential that the hen have a supply of fat in her body. A hen's body contains more fat just before the laying period than at any other time of the year.



A simple home-made dry mash hopper for laying hens.

It may be interesting to note the quantity of feed which a heavy laying hen will consume in a year's time. Lady Cornell,* a remarkable hen as an egg producer, consumed during the year 60.5 pounds, grain; 29.3 pounds, mash; 9.9 pounds, green food; 4.1 pounds, shell; 2.15 pounds, grit; and 4.05 pounds, green cut bone. With this raw material, she (weighing 3.2 pounds) produced 257 eggs weighing 29.5 pounds, a phenomenal record for a White Leghorn hen. Very few hens will equal this record, but it tends to show what careful breeding, feeding and care will accomplish.

There are many grain mixtures that may be fed, but two things should be considered in preparing such a mixture. First, it should provide a variety of foods; and second, it should not contain an excess of indigestible fiber. The "3-2-1" ration, which is fed at the University Poultry Plant, meets these requirements. It is composed of

15 lbs. cracked corn,
10 lbs. wheat,
5 lbs. oats.

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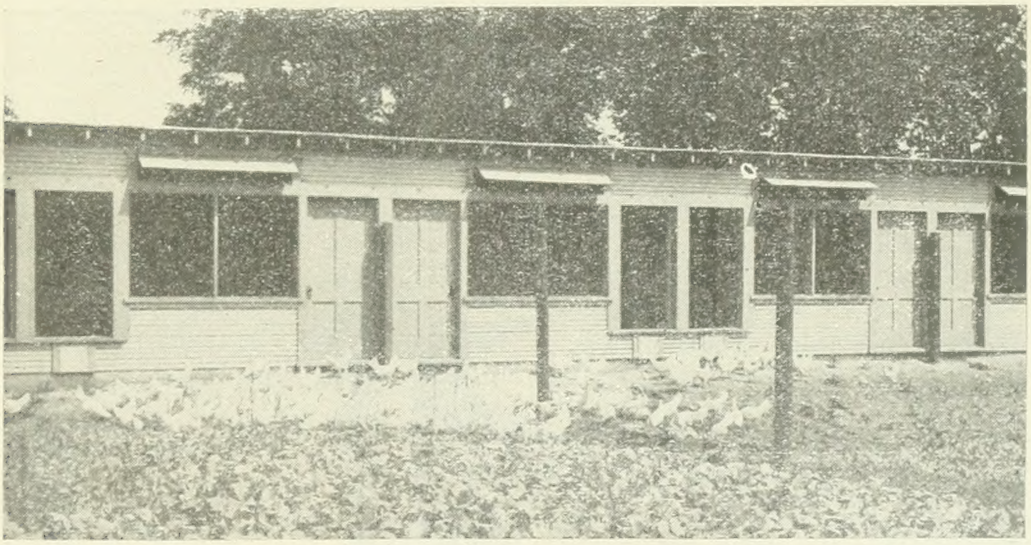
* The record hen at the New York State College of Agriculture, Cornell University—1911.

The corn is cracked to enable the digestive juices to act upon it more readily and to afford more exercise to the hens in scratching in the litter. Undamaged wheat screenings may be fed in place of whole wheat. Oats should be plump and full; otherwise, they will be wasted. The above mixture has an excess of carbohydrates, and, in order to make a balanced ration, it will be necessary to feed in addition other materials, which contain more protein than the ordinary grains.

These feeds comprise the second part of the ration, which is the **mash.** This should be composed of a variety of foods, each of which the hens like, and should contain quickly available nutrients. The mash consists of ground grains, by-products, some form of meat, charcoal, and salt. It is usually fed dry in a hopper which may be opened or closed as desired. This system is labor-saving, convenient, and tends to keep the hens in a healthy condition. Certain of the heavier breeds are inclined to eat too much of the mash. In such cases, the hopper may be kept closed during the morning and opened for only three or four hours in the afternoon. The consumption of mash can be controlled to a certain extent by regulating the supply of grain. Hens lay best and keep in the best condition when fed one-half as much mash as grain. A larger quantity is liable to cause digestive troubles. The dry mash fed at the University Poultry Plant is composed of



Rape grown in the poultry yard is the best method of supplying green food during growing season.

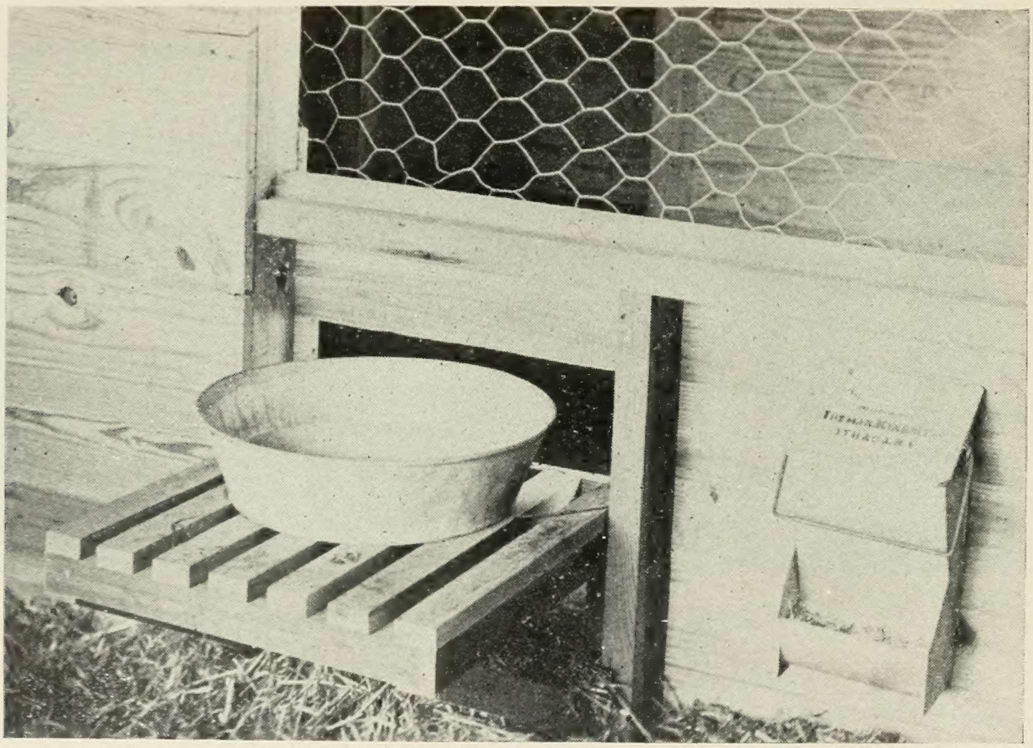
4 lbs. corn meal,
6 lbs. wheat middlings,
4 lbs. wheat bran,
4 lbs. meat scraps,
1 lb. linseed oil meal.
1 lb. alfalfa meal,
$\frac{1}{3}$ lb. fine charcoal,
1 tablespoonful salt

This is too rich in protein to be fed alone, but when it is combined with the grain, feeding two-thirds grain and one-third mash (by weight), the result is a balanced ration.

There are other rations which may be formulated to include these grains or others in different proportions. The ration which is fed at the Ohio Experiment Station is composed of the following:

Grain	**Dry Mash**
4 lbs. cracked corn,	3 lbs. corn meal,
2 lbs. wheat,	2 lbs. wheat bran,
1 lb. oats.	2 lbs. meat scraps,
	1 lb. wheat middlings.

This is fed in the same manner as is the State University ration.



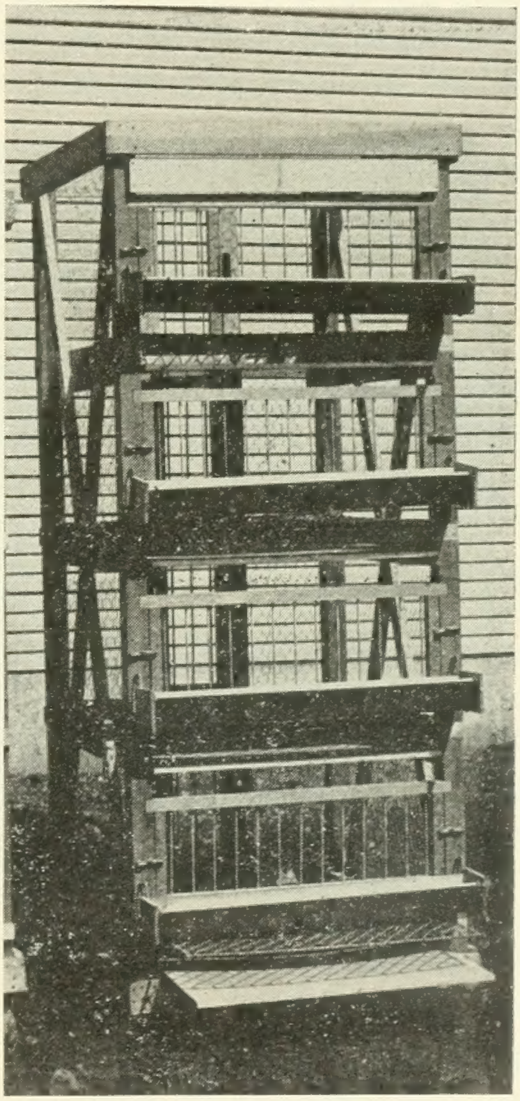
Slatted platform one foot above the floor of the pen. It will aid in keeping the drinking water clean.

Green food in some form is necessary for the health of the fowl. Its value lies chiefly in its physical effect upon the digestive system. Beets, cabbage, and sprouted oats are among the best green feeds for winter. Rape, alfalfa and clover are excellent summer feeds. As a general rule, the fowls should be fed all they will eat once a day; there is little danger of their overeating unless it be of sprouted oats. A safe amount of oats is one square inch per hen per day. If the fowls are confined in yards, some form of green food should be grown in the yards. Rape, if planted after a good rain, will soon develop plants sufficiently large to supply green food for a number of hens. The fowls should be confined for two or three weeks until the plants are well rooted.

Green cut bone is an excellent food for winter egg production. It is generally less expensive than meat scraps and is eaten more readily because of its fresh condition. If fed daily in connection with the mash, one pound to thirty hens should be the maximum quantity. When no mash containing meat scraps or other meat food is fed, the quantity of green cut bone may be increased to one pound to sixteen hens. The best results are obtained by feeding the bone three times a week rather than every day. Under no circumstances should it be fed during the warm summer months.

Grit and shell should be fed in open hoppers. Without grit, the hen cannot grind the hard grains which are fed to her and without shell, she will lack the lime to make the shell of the egg. It is not safe to assume that the hen will find by foraging all that she needs.

The last and most important food is water. Eggs are composed largely of water, and hens which have an irregular or insufficient supply of water will suffer, particularly in summer. A large pan with sufficient water to last a day should be in each pen. A platform fastened to the wall of the pen about twelve inches from the floor will aid in keeping the water from becoming filthy with straw and dirt.



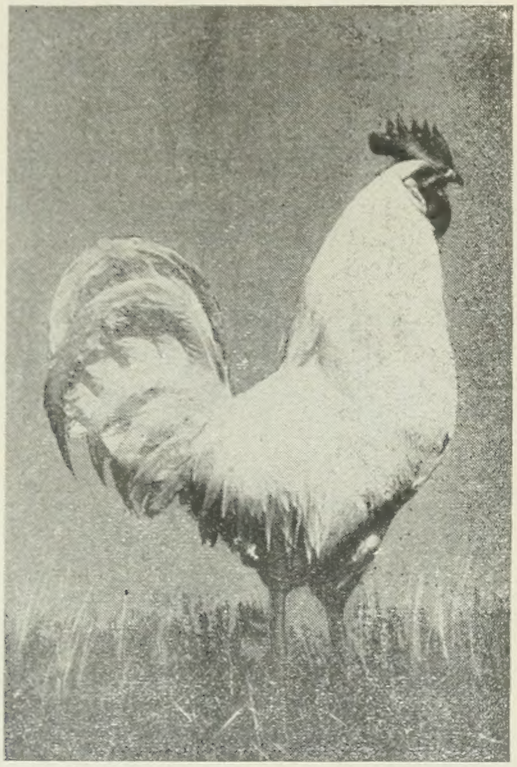
A crate in which to feed market poultry.

3. FEEDING MARKET POULTRY

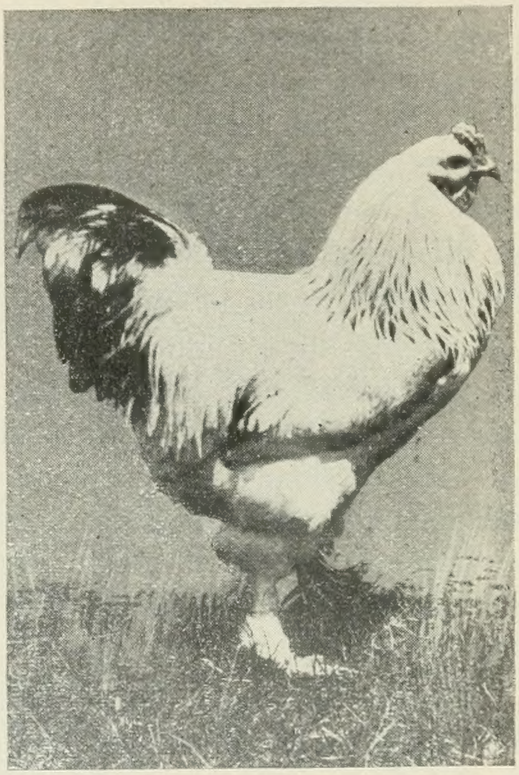
There are establishments in the larger cities that make a business of buying farm poultry, fattening it by crate-feeding and marketing it at high prices as ''milk-fed'' poultry. This poultry can be fattened as economically on the farm as in the city.

In the production of eggs, the feed is transformed into eggs and the body remains firm and muscular; in the production of flesh, the food is used to produce, soft, tender meat. Exercise is essential for egg production; a lack of exercise is favorable for fattening. The value of milk-fed poultry lies in the quality and in the additional quantity of flesh. The fat is distributed throughout the flesh. A fowl possessing much fat in the abdomen may have dry, tasteless flesh.

Wyandottes, Plymouth Rocks, Orpingtons, Dorkings and Rhode Island Reds may be fattened at a profit. Young birds fatten more easily than old fowls. Broilers and fryers weighing from ¾ lb. to 3½ lbs. make the most profitable gains. Fattening should be done during mild weather.



A strong vigorous White Leghorn cock. This breed is noted for its egg-producing qualities.



A vigorous Light Brahma cock. This breed is noted for its meat-producing qualities.

The birds are placed in the compartment late in the afternoon, as they are not so nervous and excited at this time in the day. The first feed the following morning consists of a mash of ground grains and milk. The success of this work depends upon the assimilation of food; therefore, the fattening mash should be properly mixed and fed.

Corn meal, wheat middlings, low grade wheat flour, buckwheat meal and barley meal are used by expert feeders. The market price and availability will determine the grains used. There are many others, such as shredded wheat waste, boiled potatoes, oat and graham flour, that can be used to advantage. Alfalfa meal or sifted meat scraps often constitute ten per cent of the ration, but these are necessary only when neither milk nor buttermilk is used. The simplest ration is composed of 6 pounds corn meal and 4 pounds low-grade wheat flour, mixed with butter milk or sour skim-milk

Buttermilk or skim milk is regarded as necessary to secure good results. Usually the mash consists of 40 per cent meal and 60 per cent milk. A mixture of 60 per cent buttermilk or skim milk and 40 per cent meal, mixed to the consistency of pancake batter or thick cream, gives good results. Enough for one feeding should be mixed at one time. The milk is poured into the pail or tub and the meal mixture is stirred in gradually to prevent its becoming lumpy. In cold weather, the milk is heated before the meal is added.

The feed should not be too thick, as the birds have a tendency to be satisfied with a small quantity and will not get enough liquid to supply the demands of the system. No water is fed aside from that in the milk. In warm weather, the feed should be thinner than in cool weather.

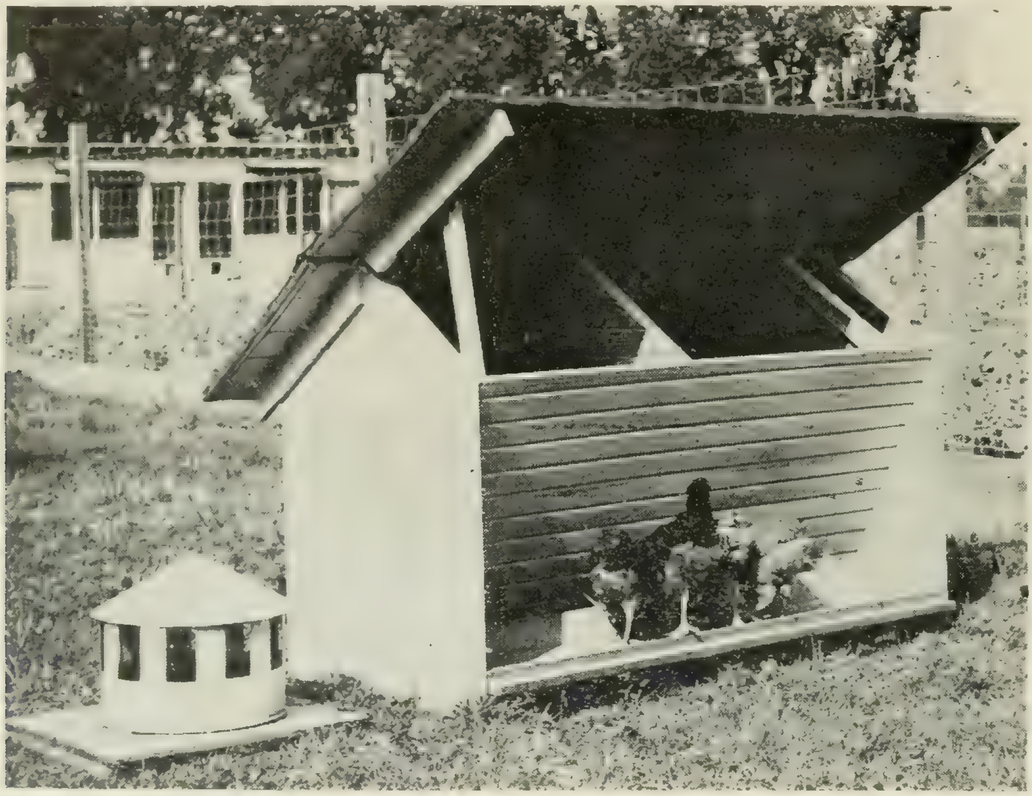
Under ordinary farm conditions, the best results are secured by feeding regularly at 6:30 A. M.; 12 noon; and 4 P. M. The appetite and size of the birds and the season of the year will determine the quantity of feed. More feed will be consumed by a growing fowl than by a two-year-old hen and will produce a greater gain. In any case the birds should be fed all the mash they will consume in fifteen minutes. What remains in the trough after each feeding should be removed.

The period of fattening lasts from 10 days to three weeks. Usually the best results are obtained in a period of two weeks or less, although the condition of the birds should determine to a certain extent the period during which they should be fed. When they are fed for less than ten days, they can not be classed as milk-fed poultry.

FEEDING YOUNG CHICKENS

There are two factors that determine successful chick feeding, (1) the composition of the ration and (2) the method of feeding. All chick feeding aims towards the successful raising of the largest number of chicks at the lowest cost. By "successful raising" is meant the development of the chicks into large, vigorous cockerels and pullets with the minimum mortality.

The rations for chicks must meet all the requirements of those for laying hens and must be more exacting in some respects. The ration must be extremely digestible, especially during the first week of feeding. It should be composed largely of such foods as rolled oats, hard-cooked eggs, cracked wheat, cracked corn, sifted meat scraps, wheat middlings and corn meal. Bulky foods, such as bran and alfalfa meal, should be fed in smaller quantities. The ration must also be appetizing. A chicken two or three days old will eat more readily of a ration which has a pleasing aroma and a good flavor. Chopped, cooked eggs, lettuce, and buttermilk add to the palatabiity of any ration, while poor meat scraps, musty grains or spoiled vegetables not only detract from the entire ration but may cause serious digestive troubles.



An outdoor self-feeding hopper for growing chicks and a sanitary water pan.

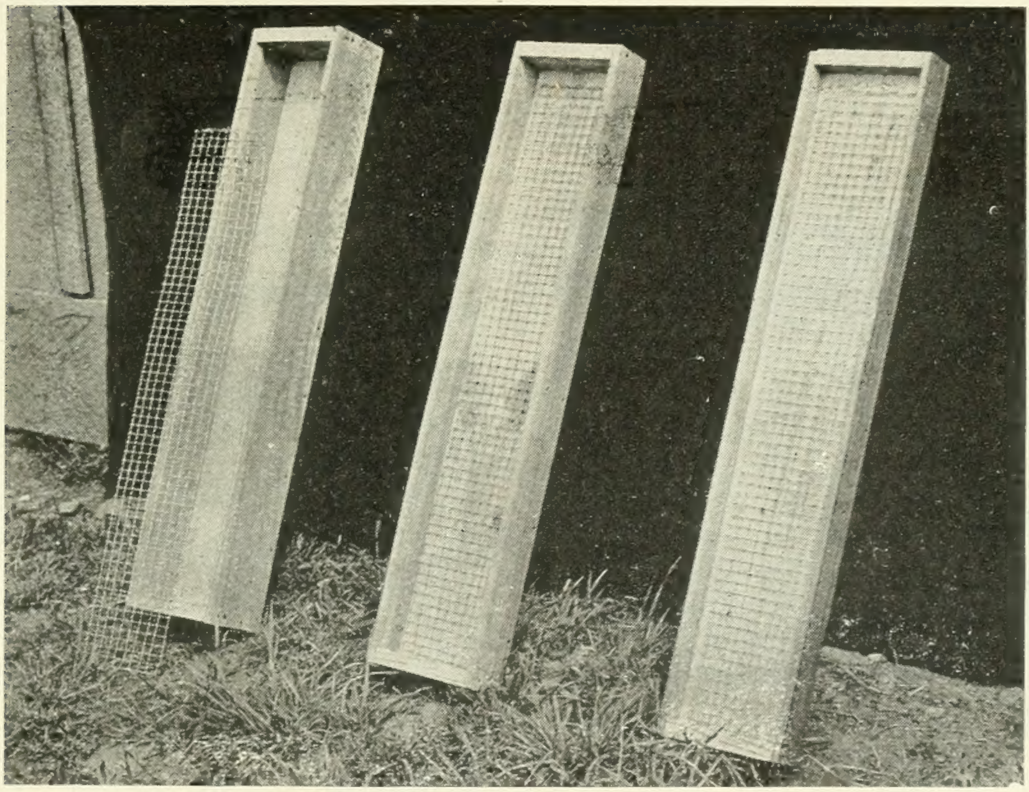
The following ration is one which meets the requirements noted above and which has been thoroughly tested. In the spring of 1912, the ration was fed with exceptional results to 780 chicks at the University Poultry Plant. The chicks made an excellent growth and the mortality up to four weeks was less than 1 per cent, and less than 5 per cent to eight weeks. Much of the mortality from the fourth to the eighth week was due to the depredations of animals, as the chicks were given free range.

Grain Mixture No. 1

3 lbs. cracked wheat
2 lbs. fine cracked corn

Mash Mixture No. 3

4 lbs. rolled oats
3 lbs. corn meal
3 lbs. wheat middlings
4 lbs. sifted meat scraps
6 lbs. wheat bran
1 lb. alfalfa meal
$\frac{1}{4}$ lb. bone meal
$\frac{1}{4}$ lb. fine charcoal



Three sizes of trays for feeding chicks. Dimensions 2x6x30 inches, 3x6x30 inches, and 4x5x30 inches. Observe the half-inch hardware cloth for preventing waste.

Grain Mixture No. 2

2 lbs. cracked wheat
2 lbs. cracked corn.

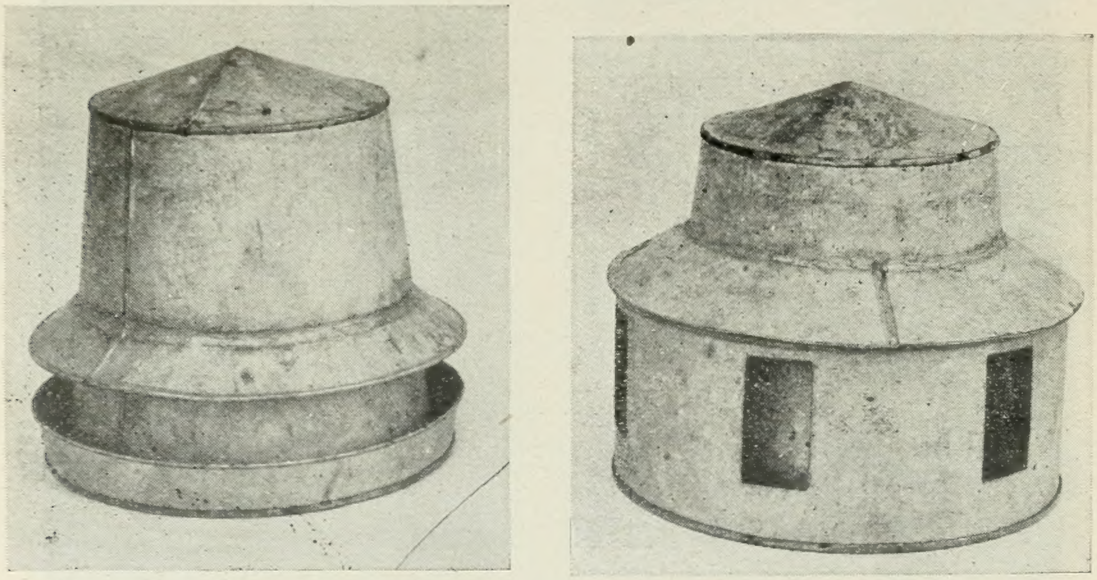
Chick grit, granulated bone, lettuce, cabbage, clover, alfalfa.

Mash Mixture No. 4

2 lbs. wheat bran
1 lb. rolled oats
1 lb. sifted meat scraps
1 lb. wheat middlings
1 lb. corn meal
$\frac{1}{2}$ lb. alfalfa meal
$\frac{1}{8}$ lb. fine charcoal

Before the method of feeding is discussed, a word should be said in regard to the brooder. This should be prepared several days before the chicks are hatched to insure its working properly. The floor should be covered with a litter of cut hay or straw. Saw-dust or bran should not be used, as there is a danger of the chicks eating a large quantity of these materials. Sand soon becomes filthy and requires frequent changing. One or more small fountains, according to the size of the brooder, should be filled with fresh water and placed on the floor near the hover. The brooder is then ready for the chicks, as far as feeding arrangements are concerned.

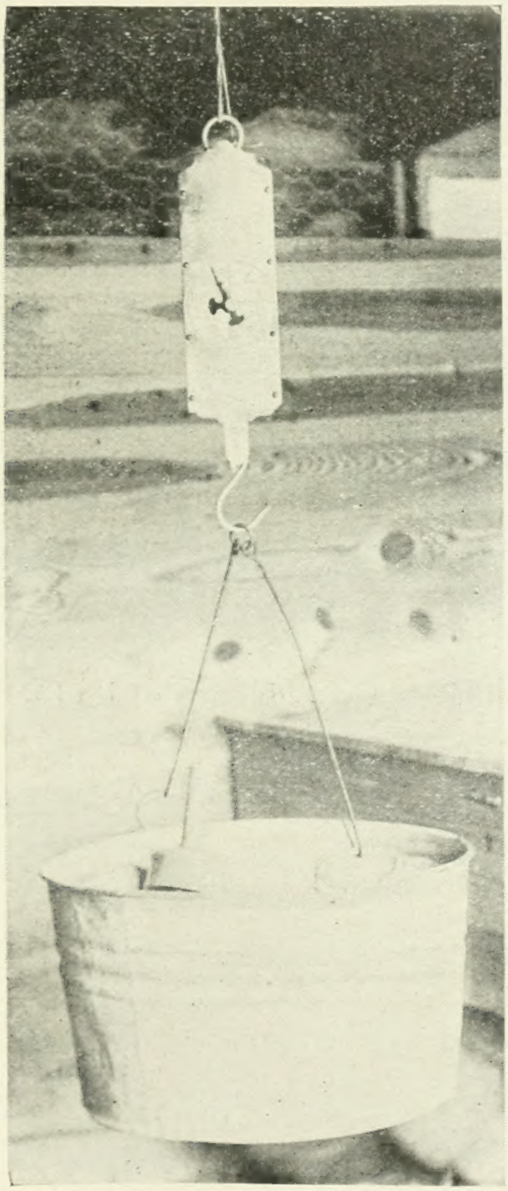
The chicks should be placed in the brooder during the morning, providing they are thirty-six hours old. It is not advisable to remove them from the incubator before that time. This practice will allow several feedings before evening, and the chicks will get a good start the first day. As soon as they are accustomed to their quarters, they may be fed a moist, crumbly mash, which is made by mixing Mash Mixture No. 3 with a small amount of skimmed milk or buttermilk. Enough milk to make the mash moist but not sloppy should be added. During the first three days, cooked, infertile eggs and chopped lettuce or cabbage leaves should be added to the mash in the proportion of one part eggs and lettuce to three parts mash. Incubator chicks are not so intelligent as hen-reared chicks and it requires some patience to teach them to eat. One may attract the chicks to the food by scattering the mash on a board and tapping it gently. For a few days, until the chicks become accustomed to the attendant's presence, it may be necessary for him to leave the chicks at feeding time. As soon as a few learn to eat, the others follow their example. If three or four chicks



Courtesy N. Y. Agricultural College.

Sanitary drinking fountains for young chicks.

that are four or five days old can be put into the brooder, they will, by their example, teach the others to eat and drink. Such chicks are commonly called "educators." The mash is fed three times a day from the first until the fourteenth day. After the third day the mash may be fed in trays 6 inches wide, 2 inches deep and 30 inches long, which prevent the chicks from wasting the food, and if the trays are removed as soon as the chicks are through feeding, they will not become soiled. It is absolutely necessary that the trays be kept clean. No rule in regard to the exact quantity to feed can be made. Usually, the quantity that the chicks will clean up in fifteen minutes is sufficient. It is not advisable to save mash from one feeding to the next as there is danger of its becoming sour.



A simple, cheap method of weighing feed.

In the afternoon at 4, the chicks should be given the first feed of Grain Mixture No. 1, a sufficient quantity to keep them busy until dusk. An excess of feed is better than too little, for, if it is not all cleaned up, it will be ready for the chicks the first thing in the morning. There are a number of prepared feeds on the market, some of which are very good as a rule too expensive for anyone raising a large number of chickens. A little sand and grit should be scattered in the litter during the first few days. The grain feeding is repeated at 7:00 in the morning and is continued twice a day until the fourteenth day. Thus the chicks are fed five times a day from the first to the fourteenth day.

Beginning the fourteenth day, a gradual change is made in the ration. The bone meal is dropped from the mash and granulated bone and grit are fed in hoppers. Vegetable food is fed separately once a day. If possible, the chicks should be given a range of clover and grass, which makes it unnecessary to feed any green food. The moist, crumbly mash should be gradually changed to a dry mash by feeding the nine o'clock and the three o'clock mash as usual and, instead of the noon feeding, allowing the chicks to have for an hour a tray of dry Mash No. 4. This plan of feeding is followed for three or four days. Then the morning feed is eliminated and the chicks are allowed dry mash all day in open hoppers. To force the chicks, the afternoon feeding of moist mash may be continued until they are mature but, as a general rule, it is more convenient to discontinue the moist mash after the eighth week and allow the chicks to hopper-feed themselves. A tray similar to the one used for the moist mash is used in feeding the dry mash, the difference being that it is made 4 inches deep instead of 2 inches and that a piece of half-inch mesh hardware cloth is laid over the feed to prevent the chicks from scratching it out on the floor.

As the chicks become larger, an upright hopper similar to the one shown (on page 12) may be used. If only a small number are being fed, the "Ohio State" hopper will be adequate. Either of these hoppers is inexpensive and easily made. The advantages are, that the feed does not clog in the hopper, the chicks cannot waste it, and it is accessible to all.

The grain may be hopper-fed after the fourteenth day by feeding a limited quantity of Grain Mixture No. 2 in a hopper and gradually increasing it until the chicks have unlimited supply. Growing chicks are able to balance their own rations, especially if they have free range, and it is rare that any suffer from over-feeding after the third or fourth week.

Table scraps used as chicken feed are often a saving. Only wholesome vegetable and meat scraps should be used. These, after being cooked, may be ground in a food-chopper and added to the mash in the same proportion as the eggs. If there is a considerable quantity of meat in the table scraps, the meat scraps in Mash Mixture No. 3 may be decreased one-half.

A limited quantity of buttermilk is an excellent food for chicks. Sweet skimmed milk is also relished, but if there is danger of its turning sour before being entirely consumed, it will be safer to feed it sour. Vessels used for this purpose should be scalded once a week as disease will spread rapidly through the medium of spoiled milk. Chicks should never be compelled to drink milk by the withholding of water.

In conclusion, it may be well to emphasize a few of the most important essentials of successful chick feeding.

First, the chicks should be fed sparingly five times a day during the first fourteen days.

Second, the ration should contain a variety of foods that are easily digested.

Third, green food in some form should be a part of the ration from the first day to maturity.

Fourth, the chicks should be permitted range after the fifth day. Chicks will not thrive on board floors.

Lastly, cleanliness should be observed in connection with the brooders, feeding trays, water fountains, mash hoppers, and everything with which the chicks come in contact.